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ABSTRACT

Three language models (Staats, Lenneberg, and Piaget) are reviewed, and implications for reading are suggested. Staats' behaviorist stance maintains that imitation, mediation, generalization, and discrimination are key concepts in language learning behavior. Critics contest the importance of these concepts and claim that behaviorists cannot fully account for language development. The biological theory presented by Lenneberg contends that language is a manifestation of innate species-specific propensities, that language develops in a fixed sequence, and that the crucial period for language development is between ages 2 and 4. Each of these claims is challenged by critics. Piaget maintains that language development comes only after a certain level of cognitive development is reached by the child. An enriched environment conducive to teaching the child to think is essential to language development. Critics of this theory suggest the need for more research concerning the relationship of language to cognition. Some contradictory implications of these models for reading are listed, and references are included. (AL)

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LANGUAGE MODELS AND THEIR RELATION TO READING

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The original goal of the Right to Read Targeted Research and Development Project was to identify existing models or partial models in three areas, the reading process, learning to read, and language and, by means of a critical analysis of the basic concepts of each model and an examination of the pertinent research literature, determine which of these models appeared to be promising in terms of its inherent consistency, parsimony, and elegance, and in terms of its implications for reading.

A paper written in the early months of the project (Athey, 1970) identified and briefly discussed the major models in the area of language development. A subsequent working paper (Athey, 1971) attempted to examine the research literature in terms of the various models. This paper will be more selective in reviewing one or two types of models in terms of their strengths and weaknesses, and suggesting some implications for reading. The models of Staats, Lenneberg, and Piaget have been selected for this purpose.

Staats' operant conditioning model

Staats, of course, represents the operant conditioning school of behaviorist-psychology. The application of behaviorist principles to language acquisition has been discussed by a number of theorists, but the basic paradigm is Skinner's "three-term contingency" model S-R-S, in which the stimulus elicits both a response and a reinforcing stimulus. Primary reinforcers are those which satisfy

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a biological need, but much human behavior and certainly most language behavior depends on secondary reinforcers (e.g. praise) which have been associated with primary reinforcers in the past. For example, babbling gives way to infant speech because sounds which are recognizable become reinforcing in their own right as a result of being paired with primary reinforcements, such as the mother feeding her child as she talks to him. From this basic situation, the child's language is "shaped" -- he is rewarded for successive approximations to adult speech. Hence imitation is an important concept in this model.

When it comes to explaining how a child understands the words he uses, Staats (1964) and other behaviorists invoke the concept of mediation. A word is said to have meaning when part of the covert response to the object is transferred to the word by conditioning. This implicit response is a mediating response. Mediating responses are names, labels, or linguistic responses which mediate between stimuli and behavior (Jensen, 1966). Mediation is derived from simple S-R associations in which one stimulus elicits several responses, or several stimuli elicit the same response, or a response in one situation is a stimulus in another situation. Mediation is thus held to account for much complex linguistic and cognitive behavior (Staats, 1968). In fact, it has been shown that children do learn to recognize and distinguish objects more rapidly if they have names for these objects (Pyles, 1932) or learn lists of pictures, if they have a mediation paradigm (Boat and Clifton, 1968). It has been suggested that very young children do not make mediating responses (Reese, 1962), (the "mediation deficiency hypothesis"), but that in older children such responses become unconscious and automatic (Jensen, 1966). In a study of children's transpositions, Potts (1968) found that five-year old children seemed to benefit from mediating behavior more than three- or four-year olds in the solution of a task. It may be that young children use mediation in fewer situations.

Two Russian studies (Bassin and Bein, 1961; Novikova, 1961) investigated the automatic, internalized mediation of adults by measuring the electrical charges in the subjects' mouth and facial muscles. They found definite increase in charges as the subjects performed increasingly difficult tasks, providing some evidence for the function of verbal mediation in problem solving.

Osgood (1968) makes a distinction between representational mediation theory as represented by Mowrer and himself, and nonrepresentational theory represented by Skinner. In nonrepresentational theory, the mediating response to the sign is a replica of the response to the stimulus object, while representational theory holds that this response is a "nonobservable, proper part (but not replica)" of the total response to the stimulus object.

Another important concept in this model is that of generalization and the related concept of discrimination. If the same name or label is given to different objects, the linguistic and emotional mediating responses will generalize. By the same token, if different labels are given to very similar objects, the mediating responses will be more discriminating, assuming that the subject apprehends the distinctions inherent in the different labels. Hence, through labelling, learned responses may be transferred to new objects or situations, providing a highly economical and efficient mode of learning. These generalizations and discriminations are often culturally important. It might be noted, parenthetically, that Braine (1963) has proposed a "contextual generalization" hypothesis in which the temporal positions of terms in a sentence are carried into new analogous contexts, thus serving to explain linguistic productivity.

Criticisms of the behaviorist model

Critics of behaviorist models of language learning have been vociferous and persistent. The major complaint seems to center around the inadequacy of the

concepts taken singly or as a system, to explain more than a small portion of the behavior in question. As McNeill (1970, p. 1086) points out: "It is the phenomenon of abstraction, which all children face and overcome, that eliminates stimulus-response theory as a possible explanation of language acquisition."

In addition, several of the key concepts, notable imitation and generalization, have come under attack. With respect to imitation it may be noted that: (1) Children's ability to reproduce sentences they hear is limited to what they can produce in spontaneous speech (Ervin, 1964); (2) the order in which inflections appear in children's speech is weakly correlated with the frequency of these forms in the speech of the adults they hear (Bellugi, 1964); (3) when children fail to comprehend the sentence they are asked to imitate, the imitation either expresses a different meaning or no meaning at all (Slobin and Welsh, 1967); (4) Since children assimilate adult models into their own grammers, imitation plays no role in the acquisition of new transformations (McNeill, 1970, p. 1114); (5) children often produce regular forms of irregular verbs (e.g. digged) even though they have never heard these forms in adult speech (Ervin, 1964); (6) children omit certain aspects of the model's utterance, e.g. his gruffness of voice. (7) A child can pick up a second language from other children who are not precise or accurate in their speech (Chomsky, 1959).

McNeill (1970, p. 1102) makes a distinction between two uses of the term imitation. The first is a general sense as for example, writing prose in the style of Faulkner, or driving on the right hand side of the road. In this broad sense, children acquire language through imitation. The second is a narrower, more technical sense, which involves copying the behavior of a model, e.g. plural inflections on English nouns. It is this technical sense, he maintains, that is inappropriate for langauage acquisition.

The concept of generalization has also been the object of some criticism. One difficulty appears to be that children classify words into pivot or open

class in ways consistent with more subtle differentiations they will make in the future. McNeill (1966) for example cites the case of a child whose pivot class contained members of several adult grammatical classes (demonstratives, adjectives, possessives, etc.) although none of these classes were at that time a part of the child's grammar (McNeill, 1970, p. 1086).

Basically, the linguists' position is that behavioristic models are simply incapable of accounting for the known facts of language development. Behaviorists in turn dismiss this contention, maintaining that "integrated learning theory is fully capable of indicating in a credible and useful manner how language behaviors mediate such cognitive behaviors as reasoning, problem solving, intelligence, perception, and so on" (Staats, 1968, p. 158).

Lenneberg's biological model

Lenneberg (1967) presents a theory based on the premise that language acquisition has a biological basis, and is a manifestation of innate species-specific cognitive propensities. The cognitive function which underlies language is an adaptation of the ability to extract categories and similarities (p. 374). Language is a peculiarly human function, for animal communication shows no evidence of being a gradual approximation toward language (Lenneberg, 1964, p. 237). The continuity of animal and human language is a matter of continuing debate (Fillenbaum, 1971, p. 257), but Lenneberg's position is unambiguous on this point.

As evidence of the innate biological basis of language, Lenneberg (1967, p. 374) points to the existence of language universals, which he describes as follows: (1) All languages have a phonemic system; (2) all are concerned with the same aspects of the environment; (3) the syntax of languages is basically of the same type, i.e. words and morphemes that fit into functional categories; (4) all languages can be judged as either grammatically acceptable or unacceptable. Language universals are determined by the limitations set by the cognitive functions that are characteristic of man. Concept formation is primary, and

naming a secondary process (p. 333).

To further support his theory, Lenneberg contends that all important milestones in speech acquisition are reached in a fixed sequence, at a constant chronological age, and outlines the stages in this sequence. Cazden (1969) has noted that studies of early language acquisition do in fact show striking similarities in the stages of development across children, with equally striking deviations from adult grammar. Eiman et al. (1971) have demonstrated that 1- and 4-month old infants can discriminate between varied and voiceless consonants in the same way as adults. Ervin and Miller (1963) observed that children acquire prelinguistic articulatory control by the age of 8-10 months, the onset of 1- and 2-word utterances between the ages of 1 to 2 years, and the use of plurals before age 3. Braine (1963) reported that 5 or 6 months after 1-word utterances are established, children show an upsurge of different word combinations used in 2-word utterances. Dellugi (1965) found a sequence of three stages between 18 and 36 months in the development of the interrogative. Ervin-Tripp (1970) also found a fixed sequence in which responses to various type of questions were learned between the ages of 2.6 and 4.2 years. She further reports use of the past tense and the notion of intention as appearing between the ages of 3 and 4 years. McCarthy (1954, p. 526) observed the use of phrases and compound sentences after 2 years, and the use of clauses by 4½ years. Anderson and Beh (1968) concluded that lexical markers are learned hierarchically during the 1st and 2nd grades of school.

Maturation of the latent language structures, according to Lenneberg's theory brings about a state of language readiness, at which time adult speech elicits a resonance which releases the synthesizing process. Language milestones are reached relatively independently of such factors as articulatory skills, intelligence, or environmental features. As evidence, Lenneberg (1967, p. 136-138) points out that up to the age of 6 months, deaf babies and hearing babies born

to deaf parents go through the same sequence of vocalizations as hearing children. Ervin and Miller (1963) also report that deaf children during the prelingual period (0-3 months) make the same sounds as hearing children. Lenneberg (1962) reports a case history of a child who was never able to speak, but who at age 8 was capable of understanding complex syntactic structures.

Lenneberg (1967, p. 138-142) further points to the similarity of stages of development in other cultures such as the Zuni of the American Southwest, the Devi of Dutch New Guinea, and the Bororo of Central Brazil. Further evidence of the universality of language development is found in Ervin-Tripp and Slobin (1966), who reported that the earliest grammar both in Russian and English appears before 2 years of age. In a further review, Slobin (1964) cites cross-cultural research on early stages of the acquisition of grammar as indicative of the universality of the stages and the process. Likewise McNeill (1966) found that in both English and Japanese children master a generative, transformational grammar according to certain universal principles.

Mothers' attitudes toward their children are not predictive according to Lenneberg (1967, p. 136), of the emergence of various stages in speech development. Children in orphanages are often below average in speech development at 3, but have caught up by the age of 6 or 7, when the environment is enriched, providing the resonance necessary to trigger the child's latent language structure is present. Brown, Cazden, and Bellugi (1968), in their observations of parental utterances, found no evidence of the effect of reinforcement or communication effectiveness of parents of the appearance of milestones in language development.

To show that language is also relatively independent of intelligence, Lenneberg (1964) draws on his studies of retarded children. Children with IQ's ranging around 50 all possessed language, though articulation and grammar were poor, and continued to develop until the early teens, when language development "freezes."

Lenneberg generalizes his discussion of maturation of language abilities

to the naturation of cognitive processes. Maturation of cognitive processes comes about through progressive differentiation of experience, a traversing of highly unstable states whose disequilibrium leads to rearrangements of the elements of thoughts, adult thought being characterized by relatively stable arrangements. The disequilibrium of language is of limited duration; it begins around 2 and declines with cerebral maturation in the early teens, when the capacity for primary language development is lost (Lenneberg, 1967, p. 374-379).

Criticisms of the biological model

Lenneberg's review and interpretation of current knowledge of the biological substrate of language has been praised by Carroll (1968) and Whitaker (1969, 1970) among others. Lenneberg argues against the localization of brain function in language on the ground that there is little correlation between the location and type of lesion and the specific language behavior produced. Whitaker counters this argument by summarizing research evidence which, he maintains, makes a "plausible case" for the localization hypothesis.

The concept of language universals is central to Lenneberg's theory, and has received considerable attention in the literature: As Miller and McNeill (1968) point out, one must distinguish between universals in the sense of empirically established linguistic properties or relations and in terms of a theory which formulates general constraints on the form of any human language. Carroll (1968) for example, supports the theory of language universals, while cautioning against the inference that they are biologically dependent, or that there is a biologically determined upper limit on the age of primary language acquisition. He suggests that an alternative explanation might be the loss of cerebral flexibility due to the accumulation of "well-formed habits".

Fodor (1966) has also suggested that the structure which a child brings to language learning is "intrinsic" rather than innate, i.e. a very general capacity to learn the principles of language.

A challenge to Lenneberg's doctrine of the species-specific nature of language is presented by ethologists such as Thorpe (1967) who point out that language shares certain properties such as informativeness and syntactic organization with other animal communication systems. In spite of some recent work in this area (Premack, 1970; Gardner and Gardner, 1969) many linguists and psychologists remain skeptical as to the significance of similarities between human language and animal communication systems, and believe that language may be a unique human phenomenon (Fillenbaum, 1971, p. 259).

Piaget's cognitive model

A consideration of language acquisition models soon leads to the problem of the relationship between cognition and language. Piaget (1957, 1962) recognizes that any description of the child's language must ultimately be a part of the larger model of the child's developing cognitive organization. The character of language changes as the child's development moves from the sensorimotor to the preoperational and operational stages of thought. The sensorimotor period, is characterized by concrete actions in which the child learns about his world by interacting with it in terms of sensory and motor activity. Although language is not a primary characteristic at this time, clearly this stage lays the foundation for both language and thought. In the preoperational stage, egocentric speech constitutes almost half of the child's language. The child's use of symbols frees him from dependence on immediate concrete objects, but the symbols are mobile and personal. However, the use of symbols is the first step in the development of representative thought. Socialized speech, which characterizes the operational stages, Piaget sometimes refers to as communicable intelligence, since it reflects the ability to adapt information to the listener's point of view. As the child discovers the need to defend his actions and ideas to himself and others he adapts and organizes his thought and speech to this end.

Through repeated attempts to establish new levels of equilibrium, the child develops toward more sophisticated levels of logical, analytical thought characterized by the use of signs which, unlike the earlier symbol, have relatively fixed, interpersonal meaning. For Piaget, language is the vehicle which, through its interplay with the earliest forms of thought, enables the child to conceptualize the world around him, thus arriving at higher forms of representative thought.

Piaget's belief that language is structured by logic, rather than the reverse, seems to be borne out in fact. Language is a highly sophisticated tool to be used in understanding the environment, but it cannot in itself bring about that understanding unless the symbol system is grounded in concrete experience. Furth and Milgram (1965, p. 322) experimented with deaf and retarded children in an attempt "to isolate conceptual operations from antecedent and subsequent verbal factors, and to assess the role and the interaction of such variables with age and mental ability in the solution of classification problems". Two major conclusions were that there is no evidence that verbal mediation is needed as a construct in cognition, and that the influence of language on cognition is indirect. Additionally they suggest that the constant use of language with language deficient children is deleterious to their conceptual development.

Piaget draws a distinction between egocentric speech, which characterizes the first years of language usage, and is largely an expression of the child's needs, impulses, and emotions, and sociocentric speech which follows. Children's early speech does in fact often seem imbued with emotion. Leopold (1949a) believes that the first step in linguistic development occurs when a child attaches emotional significance to a sound produced accidentally. Meumann (1894) maintains that the child's first words express his "emotional relation" toward the objects and events referred to, and that this expressive aspect of children's speech maintains its dominating role for some time. Menyuk (1963b) also finds support for this aspect of Piaget's theory in her study of children's syntactic

structures. Speech is egocentric in the sense that it is not adapted to the listener. Manifestations of egocentric speech are found in monologues, (individual and collective), repetitions, gestures, mimicry, and movements. Piaget's well-known example is the child's retelling of a story to a naive listener. The narrator omits significant detail, uses pronouns which are ambiguous in reference, etc., resulting in a garbled and incomprehensible version of the original. It is also noticeable that, in making reference to themselves, children rarely use the personal pronoun, as though the implied subject were understood.

Criticisms of the cognitive model

McNeill (1970, p. 1063) believes that, unlike S-R theories, theories of cognitive development may be quite appropriate to the task of explaining language. The problem, as he sees it, is an empirical one. It consits of determining whether the known facts of linguistic development can be understood in terms of the theory. This enterprise, which he calls the problem of "cognition and language" must be distinguished from the opposite question of language influencing cognition, which historically has been called the problem of "language and cognition".

McNeill goes on to say that the problem of cognition and language has not been widely recognized, and that the most comprehensive theories of cognitive development such as Piaget's take the general form of language for granted. They have either concentrated on the problem of language and cognition, or the expression of thought in language -- which again is a different problem. Moreover, McNeill expresses some doubt as to whether existing cognitive theories could be manipulated or extended to account for known facts of linguistic development. Certainly it is more difficult to take a global theory and make it fit a specific body of factual knowledge, though in principle it should be possible, if the theory is aa comprehensive as it purports to be.

McNeill (1970, p. 1091) sees egocentrism as only a partial answer to the question why children omit the subject in sentences. For if a child were egocentric in Piaget's sense, "one must wonder why he ever included subjects at all, since all subjects would appear to be "understood" to an egocentric mind." McNeill believes that egocentrism plays a role, but it is secondary to the more fundamental role of extrinsic and intrinsic predication. Intrinsic predication includes definition, class membership, habitual activities, and self-evident qualities. Extrinsic predication states some attribute which is not an inherent quality of the subject. Both in English and Japanese, children tend to include subjects with extrinsic predicates and omit subjects with intrinsic predicates (McNeill, 1968b; Brown, Cazden, and Bellugi, 1968), as though the information contained in an intrinsic predicate were felt to be inherently true. It is possible that holophrastic utterances consist largely if not exclusively of intrinsic predicates, according to McNeill.

Implications of the models for reading

The three models examined in this paper have certain implications for reading which may be contradictory.

1. Operant conditioning models imply that there is no "critical period" beyond which little language learning takes place. On the contrary, the teacher may analyze and build on the child's skill at any point in time by systematic reinforcement of sequenced stimuli, calculated to assist the child in learning new generalizations, discriminations and mediating responses. There is some evidence that these techniques work in practice. Bereiter and Engelman (1966) have taught pronunciation and syntax to disadvantaged preschoolers, while Sapon (1966) claims to have taught speech to Mongoloid children by means of operant conditioning techniques. Gray and Fygentakis (1968) have used the same principles to teach "linguistically divergent" children and by varying the stimulus situation, have obtained response generalization from the "is" paradigm, which taught, to the "is-ing" paradigm which was not.

2. Biological models, by contrast, suggest that there is a "biological timetable" for the emergence of this uniquely human function, and that the crucial period falls in the age range of 2 to 4 years. If there is a relationship between knowledge of the spoken language and ease of learning to read as many authors suggest (Carroll, 1969; Downing, 1969; Kagan, 1969; Lawton, 1968; Zedler, 1969), then it would seem important that the child be exposed to standard English during this period. Since many children who later become reading failures hear only dialect or foreign language in the home, a case for extension of preschool education downward might be built on this conclusion.

3. Piaget's theory suggests that abstract symbols are meaningless to children unless they have a firm grounding in concrete experience. Elkind (1970) has hypothesized that the child is not ready to read until his perception is decentered and his thought is operational. Furth (1970) has used Piaget's theory to launch an attack on the school's obsession with reading to the exclusion of what he sees as its primary function, teaching children to think. The implication here is that if young children are given an enriched environment which promotes thinking, reading skill can be acquired almost casually and informally as language is. Krech (1969) has addressed himself to the problem of the precise nature of this "enriched environment." He found that the only variable which contributed to increased brain development in young rats was the freedom to roam around in a large object-filled space which presented continuous and varized maze-producing problems. Krech concludes that the type of stimulation needed is that which is species-specific. The effective rat-brain is a good "space brain;" the effective human brain is the "language brain." For this reason, Krech urges the educator to turn to the psycholinguist, as well as the proponents of the "cognitive" or "productive thinking" approach for guidance in constructing a program which will maximally enrich both the child's intellectual and linguistic development.

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